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WATER QUALITY STANDARDS SUMMARY FOR THE INTERSTATE WATERS OF IOWA

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IOWA

WATER QUALITY STANDARDS SUMMARY

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JUNE 1972

U.S. ENVIRONMENTAL PROTECTION AGENCY

IOWA WATER POLLUTION CONTROL COMMISSION

IOWA STATE DEPARTMENT OF HEALTH

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PREFACE

This summary is intended for use by those who have an interest in the water quality standards of the State of Iowa.

The information contained herein has been summarized from the document entitled "Water Quality Criteria and Plan for Implementation and Enforcement for the Surface Waters of Iowa," dated May 1967 (revised July 1, 1970) and subsequent amendments of November 5, 1970, and May 27, 1971, adopted by the Iowa Water Pollution Control Commission.

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SUMMARY

WATER QUALITY STANDARDS

FOR

THE INTERSTATE WATERS OF IOWA

Introduction

In the Water Quality Act of 1965, Congress authorized the establishment of water quality standards for interstate (including coastal) waters. The purpose of these standards is to protect and enhance the quality and productivity of the Nation's interstate waters to serve a variety of beneficial uses, such as public water supply, recreation and protection of aquatic life, and industrial and agricultural uses. This publication summarizes the standards for the general information of the American public and Federal, State and local officials as to the uses and associated requirements for interstate waterways.

The Act, which amended the Federal Water Pollution Control Act, provided for the States to have the first opportunity to establish standards for their interstate waters, which were then subject to review and approval by the Administrator of the Environmental Protection Agency.* All of the States, the District of Columbia, and the Territories of Guam, Puerto Rico and the Virgin Islands participated in this landmark effort to set standards. In the course of establishing the standards, public hearings were held by the States and other jurisdictions noted above to give the public an opportunity to participate in setting water quality objectives and standards.

Water quality standards adopted by Iowa for its interstate waters were submitted to the Department of the Interior in May 1967. On January 16, 1969, the Secretary of the Interior approved the standards with the following exceptions:

1. Treatment requirements and implementation plan for waste dischargers to the Mississippi and Missouri Rivers.

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*Prior to December 2, 1970, the Secretary of the Interior.

2. Disinfection requirements for controllable waste discharges which might be sources of bacteriological pollution.

3. Temperature criteria for interstate waters of the State other than the Mississippi and Missouri Rivers.

The Iowa Water Pollution Control Commission subsequently revised the standards to resolve the exceptions noted, and the Administrator of the Environmental Protection Agency gave complete approval to the Iowa Water Quality Standards on June 30, 1971.

The approved standards are thus both State and Federal standards, enforceable under the State water pollution control statutes and the Federal Water Pollution Control Act, as amended (Section 10). The major interstate waters for which standards were adopted are shown on the map in Figure 1, page 4.

The standards consist of three major components: designation of the uses which interstate waters are to serve, specification of narrative and numerical criteria to protect and enhance water quality, and specification of a plan of implementation and enforcement, which includes treatment and control requirements for municipal, industrial and other wastes discharged to or affecting interstate waters. These components are discussed in the following sections. All three are essential to a complete standards program.

The standards are now being implemented. However, there will be continuing research on water quality requirements for various beneficial uses and improved collection and evaluation of water quality data. As more information becomes available and experience with implementing the standards is gained, the standards will be refined and improved to reflect this new knowledge.

Should more detailed information be required on any aspect of the standards, it may be obtained from the Iowa State Department of Health, Environmental Engineering Service,* or the Environmental Protection Agency Regional Office in Kansas City, Missouri. Iowa has also established water quality standards for its intrastate waters, and information on these standards may be obtained from the Iowa State Department of Health. The addresses of these offices are given on page 24.

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*The Sixty-fourth General Assembly of the State of Iowa passed Senate File 85 which creates a new Department of Environmental Quality. The new Act, effective January 1, 1973, transfers all water supply, water pollution and solid waste activities from the State Department of Health and adds a radiation program to regulate storage, handling and disposal of radioactive materials.

Other agencies of the State of Iowa which have authority for water pollution control activities are:

Iowa State Conservation Commission	Vessels and marinas.
	Administers and protects Iowa's waters, land, forests, parks and wildlife.
Iowa Natural Resources Commission	Administers water use permit system.
	Maintains programs to prevent soil erosion and retain farmland runoff.
Iowa Department of Soil Conservation	Assists in developing soil conservation plans. Plans and finances watershed programs to reduce soil erosion.

The addresses of these agencies are also given on page 24.

IOWA INTERSTATE WATERS

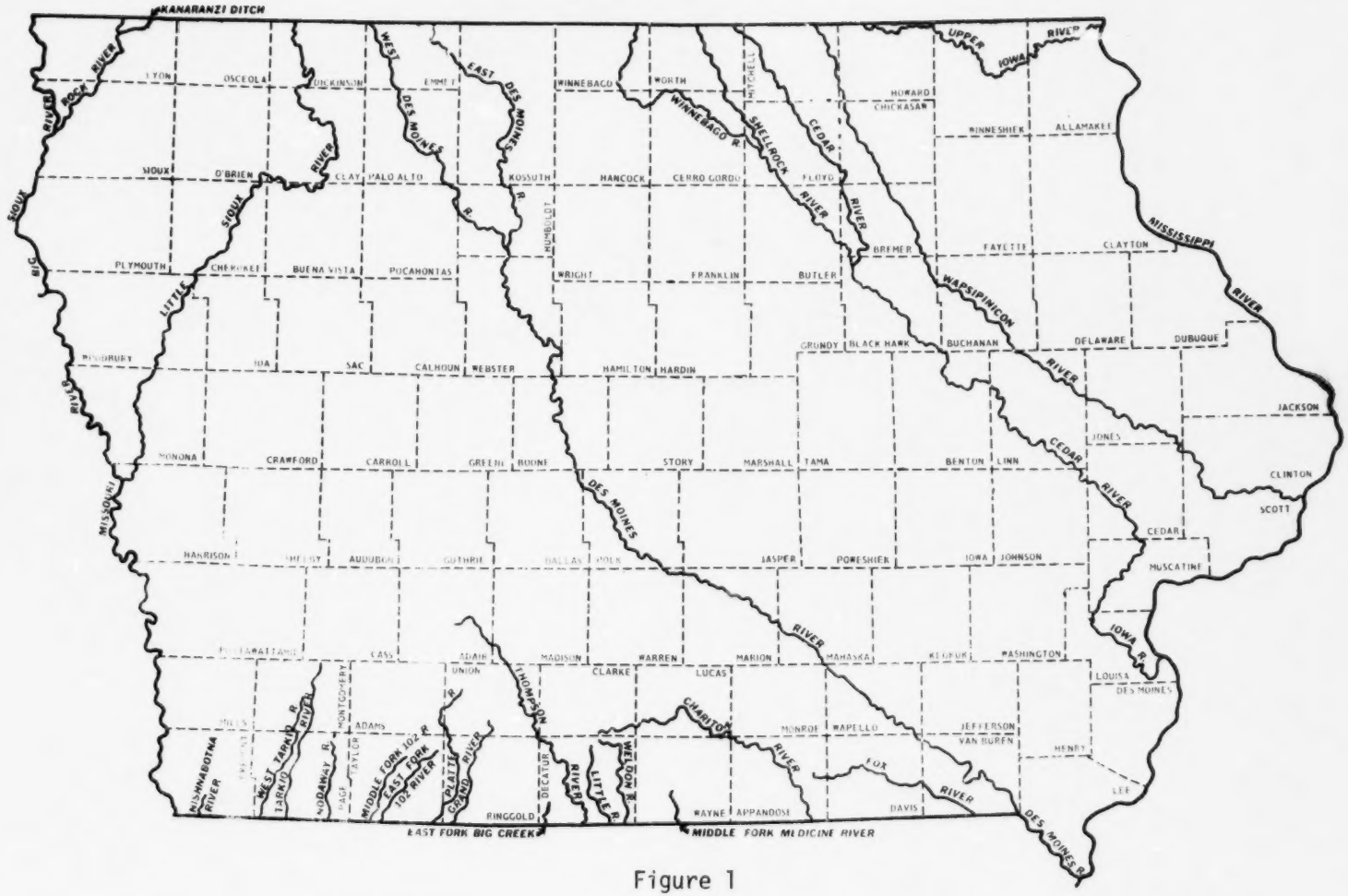


Figure 1

WATER USES

The State of Iowa designates specific criteria to protect waters classified for the following uses:

Public Water Supply

Aquatic Life--Warm Water Areas

--Cold Water Areas

Recreation

All surface waters of the State are used at least to a limited extent for livestock watering and wildlife propagation. Presently agricultural use is basically livestock watering with limited supplemental irrigation practiced. These uses are protected by the General Criteria.

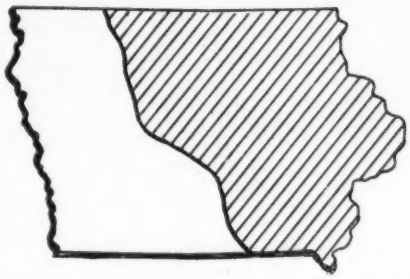
No interstate waters are designated as cold water fishery areas.

The general aim in designating uses for particular interstate waters is to recognize present uses and practicable future uses, to provide where possible for a variety of uses, and to assure compatibility of standards with Federal, State and local resource planning. In order to satisfy the intent of the Federal Water Pollution Control Act to enhance water quality, the standards specifically provide that no interstate waters may be used solely or primarily for waste assimilation. All interstate waters must be aesthetically pleasing, and this quality is usually protected by narrative criteria preventing unsightly or obnoxious conditions, such as floating debris, oil slicks, unpleasant odors and colors.

Specific use designations for all interstate waters covered by the standards are provided in Figures 2 and 3, pages 6-10.

FIGURE 2

INTERSTATE WATERS AND DESIGNATED USES

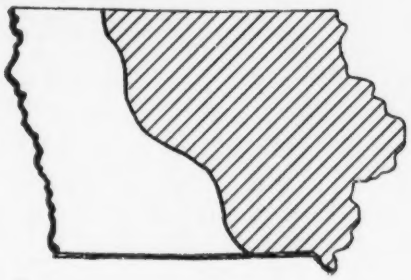


INTERSTATE WATERS	DESIGNATED USES (PRESENT AND FUTURE)					
	PUBLIC WATER SUPPLY	AQUATIC LIFE--WARM WATER AREAS	RECREATION *	AGRICULTURAL, INCLUDING LIVESTOCK WATERING AND IRRIGATION	WILDLIFE PROPAGATION	
MISSISSIPPI RIVER BASIN						
Cedar River--Minnesota-Iowa State line to confluence with Iowa River.	X	X	X	X	X	
Des Moines River--Junction of East and West Forks Des Moines River to confluence with Mississippi River.	X	X	X	X	X	
East Fork Des Moines River--Minnesota-Iowa State line to Burt, Iowa.				X	X	
East Fork Des Moines River--Burt, Iowa, to confluence with Des Moines River.		X		X	X	
Fox River--Headwaters to Iowa-Missouri State line.				X	X	
Iowa River--Junction with Cedar River to confluence with Mississippi River.		X		X	X	
Mississippi River--Minnesota-Iowa State line to Iowa-Missouri State line.	X	X	X	X	X	

*See Appendix I, page 27, "Designated Recreation Areas - Major Iowa Interstate Streams."

FIGURE 2 (cont'd.)

INTERSTATE WATERS AND DESIGNATED USES

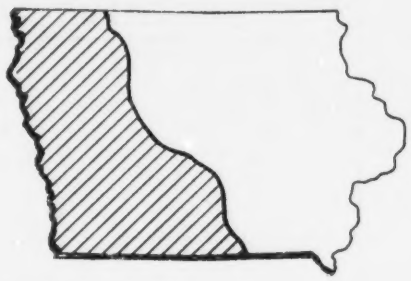


INTERSTATE WATERS	PUBLIC WATER SUPPLY	AQUATIC LIFE--WARM WATER AREAS	RECREATION *	AGRICULTURAL, INCLUDING LIVESTOCK WATERING AND IRRIGATION	WILDLIFE PROPAGATION	
	DESIGNATED USES (PRESENT AND FUTURE)					
MISSISSIPPI RIVER BASIN (contd.)						
Shellrock River--Minnesota-Iowa State line to confluence with Cedar River.		X	X	X	X	
Upper Iowa River--Minnesota-Iowa State line to Chester, Iowa.				X	X	
Upper Iowa River--Chester, Iowa, to confluence with Mississippi River.		X	X	X	X	
Wapsipinicon River--Minnesota-Iowa State line to confluence with Mississippi River.		X	X	X	X	
West Fork Des Moines River--Minnesota-Iowa State line to confluence with Des Moines River.		X		X	X	
Winnebago River--Minnesota-Iowa State line to confluence with Shellrock River.		X		X	X	

*See Appendix I, page 27, "Designated Recreation Areas - Major Iowa Interstate Streams."

FIGURE 3

INTERSTATE WATERS AND DESIGNATED USES

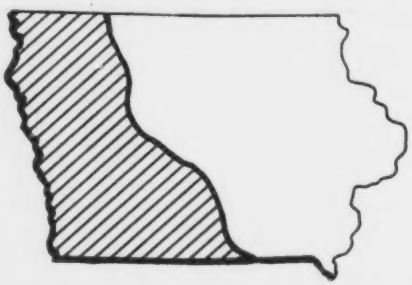


INTERSTATE WATERS	DESIGNATED USES (PRESENT AND FUTURE)					
	PUBLIC WATER SUPPLY	AQUATIC LIFE--WARM WATER AREAS	RECREATION *	AGRICULTURAL, INCLUDING LIVESTOCK WATERING AND IRRIGATION	WILDLIFE PROPAGATION	
MISSOURI RIVER BASIN						
Big Sioux River--Minnesota-Iowa State line to confluence with Missouri River.		X		X	X	
Chariton River--Headwaters to bridge at Highway 65.				X	X	
Chariton River--Bridge at Highway 65 to Iowa-Missouri State line.		X	X	X	X	
East Fork Big Creek--Headwaters to Iowa-Missouri State line.				X	X	
East Fork One Hundred and Two River--Headwaters to Iowa-Missouri State line.	X			X	X	
Grand River--Headwaters to Iowa-Missouri State line.				X	X	
Kanaranzi Ditch--Minnesota-Iowa State line to confluence with Rock River.				X	X	
Little River--Headwaters to Iowa-Missouri State line.				X	X	
Little Sioux River--Minnesota-Iowa State line to Milford, Iowa.				X	X	

*See Appendix I, page 27, "Designated Recreation Areas - Major Iowa Interstate Streams."

FIGURE 3 (cont'd.)

INTERSTATE WATERS AND DESIGNATED USES

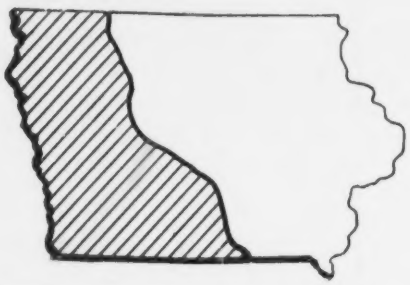


INTERSTATE WATERS	DESIGNATED USES (PRESENT AND FUTURE)					
	PUBLIC WATER SUPPLY	AQUATIC LIFE--WARM WATER AREAS	RECREATION *	AGRICULTURAL, INCLUDING LIVESTOCK WATERING AND IRRIGATION	WILDLIFE PROPAGATION	
MISSOURI RIVER BASIN (contd.)						
Little Sioux River--Milford, Iowa, to confluence with Missouri River.		X		X	X	
Middle Fork Medicine River--Headwaters to Iowa-Missouri State line.				X	X	
Middle Fork One Hundred and Two River--Headwaters to Iowa-Missouri State line.				X	X	
Missouri River--Mouth of Big Sioux River to Iowa-Missouri State line.	X	X		X	X	
Nishnabotna River--Junction of East and West Nishnabotna Rivers to Iowa-Missouri State line.		X		X	X	
Nodaway River--Junction of East and West Nodaway Rivers to Iowa-Missouri State line.		X		X	X	
Platte River--Headwaters to Iowa-Missouri State line.				X	X	
Rock River--Minnesota-Iowa State line to confluence with Big Sioux River.		X		X	X	

*See Appendix I, page 27, "Designated Recreation Areas - Major Iowa Interstate Streams."

FIGURE 3 (cont'd.)

INTERSTATE WATERS AND DESIGNATED USES



INTERSTATE WATERS	DESIGNATED USES (PRESENT AND FUTURE)					
	PUBLIC WATER SUPPLY	AQUATIC LIFE--WARM WATER AREAS	RECREATION *	AGRICULTURAL, INCLUDING LIVESTOCK WATERING AND IRRIGATION	WILDLIFE PROPAGATION	
MISSOURI RIVER BASIN (contd.)						
Tarkio River--Headwaters to Iowa-Missouri State line.				X	X	
Thompson River--Headwaters to Lower Union County line.				X	X	
Thompson River--Lower Union County line to Iowa-Missouri State line.		X		X	X	
Weldon River--Headwaters to Iowa-Missouri State line.				X	X	
West Tarkio River--Headwaters to Iowa-Missouri State line.				X	X	

*See Appendix I, page 27, "Designated Recreation Areas - Major Iowa Interstate Streams."

WATER QUALITY CRITERIA

The protection of water quality and uses requires the establishment of numerical and narrative limits on pollutants which damage the uses. The water quality criteria in this section reflect the best scientific judgment available as to the water quality requirements for the assigned uses. Numerical criteria are used wherever it is reasonable to do so. However, narrative criteria are also necessary in some cases, particularly with respect to aesthetic considerations.

Some interstate waters have a higher quality than the minimum levels assigned for protection of water uses, and the standards seek to protect this higher quality as much as possible in the face of increasing social and economic development. Scientific knowledge about the exact water quality requirements for uses is limited; and by preventing degradation of high quality waters, the standards seek to assure optimum, not marginal, conditions to protect the uses associated with clean waters.

Inasmuch as possible, the Iowa Standards tailor water quality criteria to present quality or that quality anticipated to result from the establishment of the high treatment requirements. These criteria are outlined on pages 14-17. The standards also contain general narrative criteria, including a statement on controlling degradation of high quality waters, which are given on pages 12-13. These narrative criteria also provide for the protection of small interstate streams which are not covered by specific use designations and criteria.

GENERAL WATER QUALITY CRITERIA - MINIMUM CONDITIONS

The General Criteria shall apply to all water courses and lakes at all times. For designated water use areas, the General Criteria will be supportive to the specific criteria applicable to these areas. Where a surface water has not been designated for a specific water use, these criteria will govern. The General Criteria shall be interpreted to mean that no raw or treated wastes, attributable to municipal, industrial or other sources, shall be discharged into any waters of the State which will produce putrescent or otherwise objectionable sludge deposits, floating debris, oil slicks, scum, odors, color, chemical concentrations or combinations to such a degree as to be detrimental or harmful to legitimate downstream water uses.

In general, those small intermittent streams experiencing low or zero flows or which cannot under natural conditions support a permanent fish population will have their quality governed by the General Criteria. It is the intent of the General Criteria to protect the water quality in these areas for the legitimate uses to which they are presently being used. Legitimate uses in this category are those such as irrigation, livestock watering, wildlife propagation, etc. To protect these uses on low flow streams, the wastes will be given the highest practicable degree of treatment without respect to dilution in order to prevent the development of nuisance or health problems below the discharge. The requirements are such that the effluent will be suitable for limited downstream use. Treatment less than secondary will not be accepted unless it can be shown that the legitimate uses can be protected with a lesser degree of treatment.

The following criteria are applicable to all surface waters at all places and at all times:

1. Free from substances attributable to municipal, industrial, or other discharges that will settle to form putrescent or otherwise objectionable sludge deposits.

2. Free from floating debris, oil, scum and other floating materials attributable to municipal, industrial, or other discharges in amounts sufficient to be unsightly or deleterious.

3. Free from materials attributable to municipal, industrial or other discharges producing color, odor or other conditions in such degree as to be detrimental to legitimate uses of water.

4. Free from substances attributable to municipal, industrial or other discharges in concentrations or combinations which are detrimental to human, animal, industrial, agricultural, recreational, aquatic or other legitimate uses of the water.

Antidegradation statement:

Waters whose existing quality is better than the established standards as of the date on which such standards become effective will be maintained at high quality unless it has been affirmatively demonstrated to the State that a change is justifiable as a result of necessary economic or social development and will not preclude present and anticipated use of such waters. Any industrial, public or private project or development which would constitute a new source of pollution or an increased source of pollution to high quality waters will be required to provide the necessary degree of waste treatment to maintain high water quality. (In implementing this rule, the appropriate agency of the Federal Government will be kept advised and will be provided with such information as it will need to discharge its responsibilities under the Federal Water Pollution Control Act, as amended.)

SPECIFIC CRITERIA FOR DESIGNATED WATER USES

The following criteria are applicable at flows greater than the lowest flow for seven consecutive days which can be expected to occur at a frequency of once every ten years.

Public Water Supply

The following criteria for surface water quality apply to the point at which water is withdrawn for treatment and distribution as a potable supply:

1. Bacteria: Waters shall be considered to be of unsatisfactory bacteriological quality as a source when:

   a. a sanitary survey indicates the presence or probability of the presence of sewage or other objectionable bacteria-bearing wastes, or

   b. numerical bacteriological limits of 2,000 fecal coliforms per 100 ml for public water supply raw water sources are exceeded during the low flow periods when such bacteria can be demonstrated to be attributed to pollution by sewage.

2. Radioactive Substances:

   Gross beta activity (in the known absence of 90 strontium and alpha emitters) shall not exceed 1,000 picocuries per liter.

   The concentration of 226 radium and 90 strontium shall not exceed 3 and 10 picocuries per liter respectively.

   The annual average concentration of specific radionuclides, other than 226 radium and 90 strontium, shall not exceed 1/30 of the appropriate maximum permissible concentration for the 168 hour week as set forth by the International Commission of Radiological Protection and the National Committee on Radiation Protection.

Because any human exposure to unnecessary ionizing radiation is undesirable, the concentrations of radioisotopes in natural waters shall be maintained at the lowest practicable level.

3. Chemical Constituents: Not to exceed the following concentrations:

Specific Constituents (mg/l)

Arsenic	0.05	Cyanide	0.025
Barium	1.0	Fluoride	1.5
Cadmium	0.01	Lead	0.05
Chromium (hexavalent)	0.05	Phenols (other than natural sources)	0.001

All substances toxic or detrimental to humans or detrimental to treatment processes shall be limited to nontoxic or nondetrimental concentrations in the surface water.

4. Finished Water Quality: Waters designated as a source of public water supply shall be of such quality that existing U.S. Public Health Service Drinking Water Standards for finished water can be met after conventional water treatment, consisting of coagulation, sedimentation, rapid sand filtration and disinfection.

Aquatic Life

The following criteria are designed for the maintenance and propagation of a well-balanced fish population. They are applicable to any place in surface waters, but cognizance will be given to opportunities for admixture of waste effluents with such waters.

A. Warm Water Areas

1. Dissolved Oxygen: Not less than 5.0 mg/l during at least 16 hours of any 24-hour period and not less than 4.0 mg/l at any time during the 24-hour period.

2. pH: Not less than 6.8 nor above 9.0.

3. Temperature:

a. Mississippi River--Not to exceed an 89° F maximum temperature from the Minnesota border to the Wisconsin border and a 90° F maximum temperature from the Wisconsin border to the Missouri border nor a 5° F change from background or natural temperature in the Mississippi River.

b. Missouri River--Not to exceed a 90° F maximum daily temperature nor a 5° F increase over background or natural temperature.

c. Interior streams--Not to exceed a 90° F maximum temperature nor a maximum 5° F increase over background or natural temperature.

d. Lakes and reservoirs--Not to exceed a 90° F maximum temperature nor a maximum 3° F increase over background or natural temperature.

4. Chemical Constituents: Not to exceed the following concentrations:

Specific Constituents (mg/l)

Ammonia Nitrogen (N)	2.0	*Copper	0.02
*Arsenic	1.0	Cyanide	0.025
*Barium	5.0	*Lead	0.10
*Cadmium	0.05	*Zinc	1.0
*Chromium (hexavalent)	0.05	Phenols (other than natural sources)	0.001
*Chromium (trivalent)	1.00		

*A maximum of 5.0 mg/l for the entire heavy metal group shall not be exceeded.

All substances toxic or detrimental to aquatic life shall be limited to nontoxic or nondetrimental concentrations in the surface water.

B. Cold Water Areas: All criteria stated for warm water areas apply to cold water areas except as follows:

1. Dissolved Oxygen: Not less than 7.0 mg/l during at least 16 hours of any 24-hour period nor less than 5.0 mg/l at any time during the 24-hour period.

2. Temperature: Not to exceed a 68° F maximum temperature. The rate of change due to added heat shall not exceed 2° F per hour with a 5° F maximum increase from background temperature.

Recreation

The following criteria are applicable to any waters used for recreational activities involving whole body contact such as swimming and water skiing:

1. Bacteria: Waters shall be considered to be of unsatisfactory bacteriological quality for the above recreational use when:

   a. a sanitary survey indicates the presence or probability of the presence of sewage or other objectionable bacteria-bearing wastes; or

   b. numerical bacteriological limits of 200 fecal coliforms per 100 ml for primary contact recreational waters are exceeded during low flow periods when such bacteria can be demonstrated to be attributable to pollution by sewage.

IMPLEMENTATION PLAN

The "action" plan of the standards is the plan of implementation and enforcement. This plan sets forth the requirements for treatment and/or control of all conventional municipal and industrial waste discharges in the State which affect interstate waters, specifies the time within which this is to be accomplished, and contains programs for dealing with other water pollution control problems.

The Iowa Water Quality Standards require all municipal wastes discharged into the interstate waters of the Mississippi and Missouri Rivers to receive a minimum of ninety percent (90%) reduction of BOD prior to discharge, no later than dates fixed by order of the Iowa Water Pollution Control Commission. All industrial wastes discharged into such interstate waters shall receive equivalent treatment prior to discharge, no later than dates fixed by order of the Iowa Water Pollution Control Commission.

Continuous disinfection shall be provided for all municipal waste treatment effluents and for all other wastes which may be sources of bacterial pollution throughout the year where such wastes are discharged into waters designated for public water supplies and throughout the recreational season (April 1 to October 31) where such wastes are discharged into waters used or classified for recreational use and at all other times as necessary to prevent bacterial pollution which may endanger the public health or welfare.

Information on the requirements for any particular discharger may be obtained from the Iowa State Department of Health.

Other programs to control and abate pollution are developed in the standards with a plan of action as follows:

1. Combined Sewer Overflows: It has been the policy of the State Department of Health since 1930 not to approve combined sewer systems. Under the Iowa Water Pollution Law, the overflow from the combined sewers is pollution, and the Water Pollution Control Commission recommends the separation of the systems. It is recognized that separation is a long and costly project since the combined systems are located in the older and larger cities where development has increased their replacement costs. A majority of the cities have accepted recommendations to initiate a sewer separation program on a schedule spaced over a period of time.

2. Agricultural Wastewaters: Agricultural pollution in the State of Iowa occurs basically in turbidity from soil erosion, toxicity from agricultural chemicals and wastes from feedlots.

Soil Erosion: In 1971, the Iowa Legislature enacted a Soil Conservancy District Act. This Act establishes the concept that soil erosion causing damage to others is a nuisance and must be controlled by the contributing party if at all feasible. The Act enables individual soil conservation districts to require implementation of needed soil erosion control measures. The Iowa Department of Soil Conservation is presently working with individual soil conservation districts to establish maximum acceptable soil loss limits. Once the limits are established, individual districts have the responsibility for seeing that such limits are enforced. The soil loss limits will apply not only to soil erosion resulting from agricultural practices, but also will apply to erosion caused by activities such as highway construction and urban development.

Agricultural Chemicals: With the increasing demand for higher yields, farmers are increasing the amount of herbicides, pesticides and fertilizer applications to their lands. Invariably considerable amounts of these chemicals find their way to the waters of the State. Fertilizers of nitrate and phosphate base supply nutrients which can support undesirable algal populations capable of producing taste and odors or possible toxic wastes. The control of these wastes must be in the application methods and the prevention of farmland runoff.

The State has been monitoring the surface waters since 1965 for chlorinated hydrocarbon pesticide levels. Plans are being made for the expansion of the monitoring program.

Feedlot Wastes: An increasing potential source of stream pollution is the waste from sizeable farm feedlots. The increasing concentration of livestock on fewer farms and the resulting larger operations present additional waste disposal problems.

The State is presently enforcing its cattle feedlot waste water disposal regulations. The State has recently adopted and approved regulations which include all types of livestock and poultry operations. When the regulations become effective in January 1973, the State's activities in controlling water pollution from livestock operations are expected to increase sharply.

GLOSSARY OF TERMS

Advanced Waste Treatment--Refers to methods and processes that will remove more contaminants from wastewater than are usually removed in present-day conventional treatment plants. The processes may be physical, chemical, biological, or combinations of these. Examples of advanced waste treatment are carbon adsorption, coagulation, reverse osmosis, electrodialysis, and ion exchange.

Bacteria--The best indicator of the sanitary quality of water has been an estimate of the density of coliform bacteria. There are two classifications:

1. Coliform or total coliform bacteria include a heterogeneous grouping of bacteria which are identified by bacteriological procedures to be gram-negative, non-spore-forming, rod-shaped organisms which will ferment lactose with gas formation within 48 hours at 35° C in either an aerobic or facultative anaerobic environment. Since these bacteria are present in large numbers in fecal wastes, they have been a traditional bacteriological tool used to measure the occurrence and intensity of fecal contamination in stream pollution investigations.

2. Fecal coliform bacteria are that portion of coliform population which are capable of lactose fermentation at an elevated temperature of 44.5° C. Unlike some strains of nonfecal members of the total coliform group, fecal coliforms have a specific high order of positive correlation with warm-blooded animal pollution, survive for shorter time in water and soil, and more closely correlate with survival patterns of enteric pathogenic bacteria.

Biochemical Oxygen Demand (BOD)--The BOD is the measure of the amount of oxygen necessary to satisfy the biochemical oxidation requirements of organic matter at the time the sample is collected. Unless otherwise specified, this term will mean the 5-day BOD incubated at 20° C. Waste discharges containing high levels of BOD reduce dissolved oxygen concentrations in the receiving waters.

Disinfection--A method of reducing the pathogenic or objectionable microorganisms by means of chemicals or other acceptable techniques.

Dissolved Oxygen (D.O.)--The oxygen dissolved as a gas in sewage, water, or other liquid usually expressed in milligrams per liter (mg/l), parts per million (ppm) or percent saturation. Adequate dissolved oxygen levels are necessary in waters to protect fish and other aquatic life and to prevent offensive odors. Low dissolved oxygen concentrations in receiving waters are generally due to the presence of excessive organic material as a result of inadequately treated or controlled waste (having high BOD). Excessive algal growths may cause vastly fluctuating dissolved oxygen levels. Other factors such as temperature, depth of water, and water movement influence dissolved oxygen levels.

Fish, Warm- and Cold-Water--Warm-water fish include black bass, sunfish, catfish, gar and other. Cold-water fish include salmon and trout, whitefish, miller's thumb and blackfish. The temperature factor determining distribution is set by adaptation of the eggs to warm or cold water.

Interstate Waters--Under the Federal Water Pollution Control Act, interstate waters are defined as:

1. rivers, lakes, and other waters which flow across or form a part of State or international boundaries;

2. waters of the Great Lakes;

3. coastal waters--whose scope has been defined to include ocean water seaward to the territorial limits and waters along the coastline (including inland streams) that are influenced by the rise and fall of the tide.

Intrastate Waters--Rivers, lakes, and other waters wholly within the State which do not flow across nor form a part of the boundaries of the State.

Membrane Filter (MF)--A technique of bacteriological analysis. This technique involves the running of a certain volume of water through a cellulose ester wafer which is then impregnated with growth media for bacteria.

Milligrams Per Liter (mg/l)--Milligrams of solute per liter of solution. Equivalent to parts per million assuming unit density.

"Most Probable Number" (MPN)--A test of bacterial density expressed as a number of organisms per hundred milliliters. It is a number most likely to occur, using statistical methods, under the given circumstances or conditions of the test.

pH--The index of hydrogen ion activity used to indicate the relative intensity of acidity or alkalinity of water with the neutral point at 7.0. The pH of most natural waters ranges from 6.5 to 8.5. Waters having a pH at these levels are favorable for most surface water uses including all aspects of desirable aquatic life. A pH outside this range is caused, in most cases, by decaying vegetation, inadequately treated industrial wastes, or mine drainage entering the water body.

Pollution--The introduction of substances of such character and in such quantity to a body of water that its natural quality is so altered as to impair its usefulness or render it offensive to the senses of sight, taste, or smell.

Recreation, Whole Body Contact--Activities in which there is intimate contact with the water involving considerable risk of ingestion. This includes water uses such as swimming, water skiing and skindiving. Also called "Primary Contact Recreation."

Sewage--(1) The water supply of a community after it has been used and discharged into a sewer; (2) wastewater from the sanitary conveniences of dwellings, business buildings, factories and other institutions.

Sewage, Combined--A sewage containing both sanitary sewage and surface or storm water with or without industrial wastes.

Sewer, Combined--A sewer which carries both sanitary sewage and storm drainage. At times of heavy rainfall, the capacity of combined sewers may be exceeded and sewers will overflow. The overflow will bypass the sewage treatment plant and the combined wastewaters will be discharged directly into streams without treatment of any kind. This is a problem in many older cities in the United States, and there are various programs to deal with it.

Solids, Settleable--Substances such as erosional silt, organic detritus, plankton, and sand which, because of particle size or lack of water currents, settle to the stream bed or lake bottom.

Solids, Suspended--Solids that either float on the surface of or are held in suspension by water currents.

Temperature--A measure of the hotness or coldness of water. While temperature is affected by natural conditions, man has a significant effect by the construction and operation of dams and the discharge of cooling waters from industrial processes, particularly power generation.

Toxic Materials--These may include hundreds of compounds present in waters due to industrial wastes, runoff from farm lands where pesticides have been applied, and other materials which are harmful to human, plant, animal and aquatic life.

Treatment, Primary--May be defined as that process or group of processes capable of removing a high percentage of floating and settleable solids. This is the first major treatment in a sewage treatment works and generally removes from 30 to 65 percent of the 5-day biochemical demand.

Treatment, Secondary--May be defined as that process or group of processes capable of removing virtually all floating and settleable solids, generally from 80 to 95 percent of the 5-day biochemical oxygen demand, and a similar level of removal of suspended solids in untreated waste. The equivalent treatment may generally be defined as that process or group of processes achieving maximum practicable removal of solids, oils, grease, acids, alkalis, toxic materials, bacteria, taste and odor-causing materials, color and any other objectionable constituents contained in untreated waste to produce an effluent equivalent to that obtained from secondary treatment facilities in current use for any specific category of industrial waste.

FEDERAL AND STATE AGENCY ADDRESSES

State

Iowa State Department of Health
Environmental Engineering Service
Lucas State Office Building
Des Moines, Iowa 50319

Iowa State Conservation Commission
State Office Building
300 4th Street
Des Moines, Iowa 50319

Iowa Natural Resources Commission
Grimes State Office Building
Des Moines, Iowa 50319

Iowa Department of Soil Conservation
Grimes State Office Building
Des Moines, Iowa 50319

Federal

Environmental Protection Agency
Washington, D.C. 20460

Environmental Protection Agency
Region VII
1735 Baltimore, Room 249
Kansas City, Missouri 64108

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*General criteria, pages 12-13, apply to all waters. Specific criteria, pages 14-17, apply for individual use classifications.

APPENDIX I

DESIGNATED RECREATION AREAS

MAJOR IOWA INTERSTATE STREAMS

Stream	Location	Recreation Zone
Cedar River	*Cedar Falls, Iowa	Above dam
	*Cedar Rapids, Iowa	Above dam
	*Charles City, Iowa	Above dam
	*Mitchell, Iowa	Above dam
	*Nashua, Iowa	Above dam
	Palisade State Park	Above dam
	*Waterloo, Iowa	Above dam
	*Waverly, Iowa	Above dam
Chariton River	Rathbun Reservoir	Recreation pool
Des Moines River	*Bonaparte, Iowa	Above dam
	*Des Moines, Iowa	Above dam
	*Fort Dodge, Iowa	Above dam
	*Humboldt, Iowa	Above dam
	*Ottumwa, Iowa	Above dam
	Red Rock Reservoir	Recreation pool
	Saylorville Reservoir	Recreation pool (Under construction)
Mississippi River	Minnesota-Missouri	Iowa border
Shellrock River	*Clarksville, Iowa	Above dam
	*Greene, Iowa	Above dam
Upper Iowa River	*Decorah, Iowa	Above dam
	*Lime Springs, Iowa	Above dam
Wapsipinicon River	*Anamosa, Iowa	Above dam
	*Central City, Iowa	Above dam
	*Independence, Iowa	Above dam
	*Quasqueton, Iowa	Above dam

*Nearest town.